



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/903,916	07/12/2001	Prabir K. Dutta	OSU1159-144	1865

8698 7590 06/10/2003
STANDLEY & GILCREST LLP
495 METRO PLACE SOUTH
SUITE 210
DUBLIN, OH 43017

EXAMINER

TRIEU, VAN THANH

ART UNIT PAPER NUMBER

2632

DATE MAILED: 06/10/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/903,916

Applicant(s)

DUTTA ET AL.

Examiner

Van T Trieu

Art Unit

2632

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 74.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-5, 8-25 and 27-29 are rejected under 35 U.S.C. 102(b) as being anticipated by **Castro et al** [US 5,841,021].

Regarding claim 1, the claimed sensor comprising a substrate (substrate 16 having a first side and a second side and being made of some special doped ceramic material or combinations of polymers, see Fig. 1, col. 10, lines 47-58); and the first electrode (first electrode 12, 12' or 124' deposited on the first side of the substrate 16 or 136', see Figs. 1-5 and 19, col. 9, lines 19-67, col. 10, lines 1-21 and col. 20, lines 11-43); and the second electrode (second electrode 14, 14' or 126', see Figs. 1-5 and 19, col. 10, lines 22-46, col. 11, lines 1-33 and col. 20, lines 11-43); and the sensing material (multiplayer or multifunctional gas sensor 10 or 122 having electrodes 12, 14, 124 and 126 being connected to filter material having layers 48A, 48B and/or 52 that is selected to absorb certain predetermined contaminants such as carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, hydrides of nitrogen as ammonia, primary and secondary amines and hydrazine, hydrogen sulfide, hydrogen, methanol and ethanol, toxic or flammable gas as of reducing gas stream, to provide electrical voltage signal indicating

Art Unit: 2632

to the amounts or levels of gas concentration being detected, see Figs. 17-20, col. 6, lines 37-53, col. 7, lines 23-25, col. 8, lines 63-67, col. 9, lines 45-67, col. 10, lines 1-46, col. 14, lines 59-67, col. 15, lines 1-23, col. 18, lines 46-67, col. 19, lines 1-67 and col. 20, lines 1-67).

Regarding claim 2, the claimed alumina (the substrate 16 or 136' is alumina , see col. 15, lines 49-65).

Regarding claim 3, the claimed first electrode is an interdigital electrode (the first electrode 12 or 12' provides a digital input, see col. 12, lines 20-24)

Regarding claim 4, the claimed second electrode is an interdigital electrode (the second electrode 14 or 14' provides a digital output, see col. 12, lines 20-24)

Regarding claim 5, the claimed halide (the sensing material is halide, see col. 10, lines 22-67).

Regarding claim 8, the claimed heater (the sensor 10 or 100 is heated by a temperature compensator electrode 128, see Figs. 1, 16 and 18, col. 11, lines 43-45, col. 18, lines 29-35, col. 19, lines 39-67 and col. 20, lines 1-10).

Art Unit: 2632

Regarding claim 9, all the claimed subject matters are cited in respect to claim 8 above, see Fig. 18.

Regarding claim 10, the claimed electrical property (electrical voltage, see Figs. 6-10, 15 and 16).

Regarding claim 11, all the claimed subject matters are cited in respect to claim 1 above, and including the H2, see Figs. 1-20, col. 9, line 57.

Regarding claim 12, all the claimed subject matters are cited in respect to claim 11 above, see col. 4, lines 13-15.

Regarding claim 13, all the claimed subject matters are cited in respect to claim 11 above.

Regarding claim 14, all the claimed subject matters are cited in respect to claims 10 and 11 above,

Regarding claim 15, all the claimed subject matters are cited in respect to claim 1 above as the multiplayer or multifunction gas sensor and the oxidized agent, see col. 18, lines 46-67 and col. 19, lines 1-48.

Art Unit: 2632

Regarding claim 16, all the claimed subject matters are cited in respect to claim 15 above, see col. 7, lines 57-63.

Regarding claim 17, all the claimed subject matters are cited in respect to claim 15 above and including the fuel cell in the chamber, see col. 9, lines 45-63.

Regarding claim 18, all the claimed subject matters are cited in respect to claim 15 above.

Regarding claim 19, all the claimed subject matters are cited in respect to claims 15 and 17 above.

Regarding claim 20, all the claimed subject matters are cited in respect to claims 10 and 15 above.

Regarding claim 21, all the claimed subject matters are cited in respect to claim 1 above.

Regarding claim 22, all the claimed subject matters are cited in respect to claim 21 above.

Art Unit: 2632

Regarding claim 23, all the claimed subject matters are cited in respect to claim 21 above.

Regarding claim 24, all the claimed subject matters are cited in respect to claim 21 above.

Regarding claim 25, all the claimed subject matters are cited in respect to claims 1 and 5 above.

Regarding claim 27, all the claimed subject matters are cited in respect to claims 10 and 25 above,

Regarding claim 28, all the claimed subject matters are cited in respect to claim 25 above.

Regarding claim 29, all the claimed subject matters are cited in respect to claim 1 above, and including the conduits 19, 20, see Fig. 1, col. 11, lines 46-55.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 2632

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 6, 7 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Castro et al** [US 5,841,021] in view of **Tamaki et al** [US 6,311,545].

Regarding claim 6, **Castro et al** fails to disclose the sensing material is cuprous chloride. However, **Castro et al** teaches that the electrochemical gas sensor 10 or 122 for sensing/testing a plurality of different gases and volatile substance as diverse as carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, hydrides of nitrogen, and hydrogen sulfide. The multiplayer or multifunctional gas sensor 10 or 122 includes electrodes 12, 14, 124 and 126 being coated with sensing materials such as halide metal to provide electrical voltage signal indicating to the amounts or levels of gas concentration being detected, see Figs. 17-20, col. 7, lines 23-25, col. 8, lines 63-67, col. 9, lines 45-67, col. 10, lines 1-46, col. 18, lines 46-67, col. 19, lines 1-67 and col. 20, lines 1-67. **Tamaki et al** suggests that an anhydrous zinc anti-monate semiconductor gas sensor for detecting a various reducing gases such as hydrogen

Art Unit: 2632

sulfide, hydrogen and fuel gases. The gas sensor device is coated with Cuprous Chloride (CuCl) material for detecting hydrogen sulfide, see Fig. 1, col. 1, lines 8-16, col. 4, lines 65-67, col. 5, lines 1-6, col. 8, lines 2-15. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the gas sensor of **Tamaki et al** for the electrochemical gas sensor of **Castro et al** since both gas sensors are designed to detect a plurality of different gases that including hydrogen and hydrogen sulfide gases to increase the detection functions of electrochemical gas sensor.

Regarding claim 7, all the claimed subject matters are discussed between **Castro et al** and **Tamaki et al** in respect to claims 1 and 6 above.

Regarding claim 26, all the claimed subject matters are discussed between **Castro et al** and **Tamaki et al** in respect to claims 6 and 24 above.

Response to Arguments

3. Applicant's arguments filed on 01 May 2003 have been fully considered but they are not persuasive. Because,

Applicant's arguments:

(A) **De Castro et al** fail to teach chemi-resistor sensor that relies upon the present of oxygen to operate.

Art Unit: 2632

- (B) The sensing material of the invention is different than the sensing electrode of **De Castro et al.**
- (C) **De Castro et al** fail to teach a non-conductive substrate such as alumina.
- (D) **De Castro et al** fail to teach interdigitized electrodes.
- (E) **De Castro et al** fail to teach a metal halide sensing material.
- (F) **De Castro et al** fail to teach the use of heater.
- (G) **De Castro et al** fail to teach a sensor that measures concentration as a result of resistance, impedance, capacitance conductance, inductance, voltage or current.
- (H) **De Castro et al** fail to teach the use of a device containing a sensing material that senses carbon monoxide, in a reducing environment.
- (I) The combination between **De Castro et al** and **Tamaki et al** fails to render the present invention because **Tamaki et al** teaches that the use of cuprous chloride film diminishes the sensitivity of the device which unable to detect low concentrations of gas.

Response to the arguments:

- (A) None of the claims 1-29 claims of the chemi-resistor sensor that relies upon the presence of oxygen to operate. Only the sensor comprising of the first and second electrode to conduct electricity for sensing the concentration of carbon monoxide have been claimed, which are met by the sensing electrodes.
- (B) The multiplayer or multifunctional gas sensor 10 or 122 of De Castro et al having conducted electrodes 12, 14, 124 and 126 are connected to a filter material having

Art Unit: 2632

layers 48A, 48B and/or 52 that is selected to absorb certain predetermined contaminants such as carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, hydrides of nitrogen as ammonia, primary and secondary amines and hydrazine, hydrogen sulfide, hydrogen, methanol and ethanol, toxic or flammable gas as of reducing gas stream, to provide electrical voltage signal indicating to the amounts or levels of gas concentration being detected. Thus, the multifunctional gas sensor meets the sensing material claimed limitations.

(C) The inert polymeric support can be a layer of material selected from the group consisting of alumina.

(D) The multifunctional gas sensor comprises of conducted electrodes to provide digital output.

(E) The multifunction sensor is of silver halide material.

(F) The multifunctional sensor heated by a temperature compensator electrode.

(G) The multifunctional sensor measures the concentration of gas as a result of voltage signal.

(H) As discussed in (B) above.

(I) It is obvious to combine the teaching of using cuprous chloride sensor for sensing concentrations of carbon monoxide, hydrogen sulfide, etc., since it is a multifunctional sensor, wherein the sensor sensitivity levels are depending on the environment conditions for providing a best measurement result. Table 2 of **Tamaki et al** indicates that there is only 4 out of 16 measurements are not measured because the sensitivity was too low to be measured of the hydrogen sulfide at a temperature of 300°.

Art Unit: 2632

C, while others are success. Thus, it would have been obvious to one skill in the art to recognize that the cuprous chloride sensor of **Tamaki et al** is reliable and will not limited as a better sensitivity for measuring the carbon monoxide gas at a lower temperature or room temperature as desired by a user.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

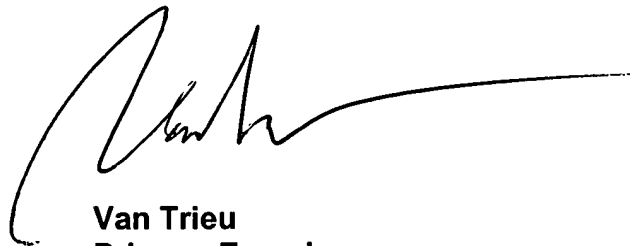
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to primary examiner **Van Trieu** whose telephone number is (703) 308-5220. The examiner can normally be reached on Mon-Fri from 7:00 AM to 4:00 PM.

Art Unit: 2632

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Mr. **Danial Wu** can be reached on (703) 308-6730.

The office facsimile number is (703) 872-9314.

A handwritten signature in black ink, appearing to read 'Van Trieu', with a long horizontal flourish extending to the right.

Van Trieu
Primary Examiner
Date: 6/3/03